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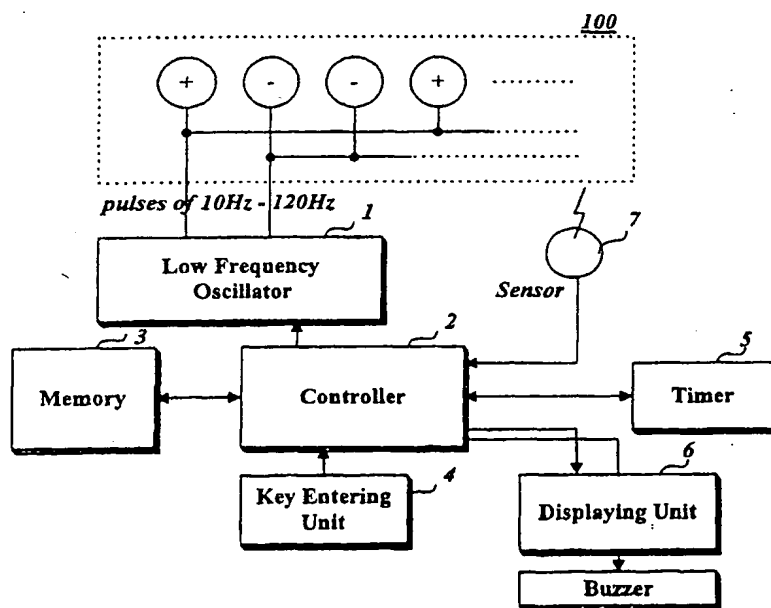
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(54) Title: APPARATUS AND METHOD FOR SELECTIVELY REMOVING A BODY FAT MASS in HUMAN BODY



(57) Abstract: The present invention relates to a method and apparatus for removing body fat. While an obesity patient or person wants to remove body fat built up in a certain part is conducting aerobic exercise such as running with attaching a surface-attaching type catheter on the fat part, the apparatus resolves and removes body fat by applying pulses, whose frequency is 10 ~ 120Hz, through the catheter, and changes the exercising condition based upon his or her heart rate and standard heart rate, thereby conducting efficient removal of body fat.

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DESCRIPTION

APPARATUS AND METHOD FOR SELECTIVELY REMOVING A BODY FAT MASS IN HUMAN BODY

1. Technical Field

5 The present invention relates to method and apparatus for removing excessive fat mass in a human body, and more particularly, to apparatus and method for removing excess body fat in a target part of human body through the processes of calculating fatness ratio (FR) and setting and controlling an aerobic exercise
10 criteria such as standard heart rate based on individual information such as age, weight, or height etc. while applying low-frequency pulses to a human body.

2. Background Art

 In general, fatness means that one's weight is above the
15 standard. To be exact, it means that body fat has been over-accumulated in a human body. Standard weight for a person is obtained by multiplying 0.9 after subtracting 100 from his or her height.

 Even though person's weight is above the standard, we will
20 not say that he or she is fat if fat mass in his or her body is below the standard FR. Also, even though person's weight is below the standard, it may be possible to say that he or she is fat if fat mass in his or her body is above the standard FR.

 Accordingly, FR to indicate how much fat mass has been
25 accumulated in a human body is basis for determining obesity patient. Standard FR for a male is 25%, and 28~30% for a female. If FR is above the standard, medical cure is needed to prevent various adult diseases.

 The body fat mass can be measured accurately with a

diagnostic apparatus such as 'body composition analyzer'. Generally, body fat mass is mainly accumulated in an abdominal region of a human body, and such body fat mass can be easily flowed into blood, which causes various adult diseases such as
5 hypertension, arteriosclerosis, diabetes, and hyperlipemia.

Accordingly, abdominal obesity of middle-aged persons is regarded as a 'red signal' warning cerebral apoplexy(palsy), myocardial infarction, etc. which might bring about sudden death. Basic method for curing obesity in oriental medicine is
10 constitutional dietary treatment and medicinal therapy. Lately, natural therapies such as the 'Ear Acupuncture Therapy', in which ears are acupunctured to control appetite and incretion, and the 'Aroma Therapy', and so on are used besides the 'Lipolysis Acupuncture' for removing target parts of a human body.

15 However, because a target part, for example, abdominal region in which fat mass is easily over-accumulated has been acupunctured for a long time in the 'Lipolysis Acupuncture', an obesity patient may suffer from inconvenience. Also, the 'Lipolysis Acupuncture' has low efficacy in removing body fat
20 because it cannot keep pace with aerobic exercises such as running which could double the efficacy.

3. Disclosure of Invention

It is an object of the present invention to provide method and apparatus for removing excessive fat mass in a human body,
25 which applies low-frequency pulses to an obesity patient while he or she keeps practicing an aerobic exercise which can double fat removing efficacy.

It is another object of the present invention to provide method and apparatus for removing excessive fat mass in a human
30 body, which controls operation of an athletic equipment such as a running machine based upon comparison of present heart rate of a user with a heart rate reference after calculating FR and setting an exercise criteria including heart rate reference automatically

based on individual information such as age, weight, height, and so on.

An apparatus for removing excessive fat mass in a human body according to the present invention, comprises a generating means
5 generating electric pulses of low-frequency band; and a transmitting means transmitting the electric pulses to an exercising person.

Another apparatus for removing excessive fat mass in a human body according to the present invention, installed in an athletic
10 equipment for effectively removing body fat during exercise, comprises a generating means generating electric pulses of low-frequency band; a transmitting means transmitting the electric pulses to an exercising human body; and an attaching means for attaching the conducting means onto the human body.

15 Another apparatus for removing excessive fat mass in a human body according to the present invention, installed in an aerobic athletic equipment, comprises a measuring means for measuring present heart rate of an exercising person; a comparing means for comparing the measured heart rate with a preset heart rate
20 reference; and a controlling means for controlling operation of the aerobic athletic equipment based on the comparison result of the comparing means.

Another apparatus for removing excessive fat mass in a human body according to the present invention, comprises a generating
25 means generating electric pulses of low-frequency band; a transmitting means transmitting the electric pulses to an exercising person; an attaching means for attaching the transmitting means onto the exercising person, wherein the generating means, the transmitting means, and the attaching means
30 are installed in an athletic equipment; a measuring means for measuring present heart rate of a person exercising on the athletic equipment; a comparing means for comparing the measured heart rate with a preset heart rate reference; and a controlling

means for controlling operation of the athletic equipment based on the comparison result of the comparing means.

A method for removing excessive fat mass in a human body according to the present invention, generates electric pulses of 5 low-frequency band, and transmits the electric pulses to an exercising person.

The present invention for removing excessive fat mass in a human body enables an obesity patient or a person, who wants to remove his or her fat mass, to keep practicing an aerobic exercise 10 such as running for a long time with a plurality of pads attached onto his or her fat parts while electric pulses of frequency 10 ~ 120Hz, which resolves body fat through stimulus, are being applied through the attached pads.

The present invention for removing excessive fat mass in a 15 human body also calculates user's FR and sets aerobic exercise criteria including heart rate reference automatically based on person's information on age, weight, height, and so on, and changes an exercising condition of an athletic equipment such as a running machine based upon comparison of his or her heart rate 20 with the heart rate reference.

According to the present invention, body fat removal efficiency by an aerobic exercise can be doubled.

4. Brief Description of Drawings

The accompanying drawings, which are included to provide a 25 further understanding of the invention, illustrate the preferred embodiments of the invention, and together with the description, serve to explain the principles of the present invention.

In the drawings:

Fig. 1 is a simplified block diagram of an apparatus for 30 removing fat mass in a human body according to the present invention;

Fig. 2 is a pictorial representation showing a belt-type conducting means with pads for surface-attaching;

Fig. 3 is a flowchart of a method for removing fat mass in a human body according to the present invention;

Fig. 4 is an exemplary table showing entered individual information of a user and related aerobic exercise criteria set
5 automatically based on the individual information;

Fig. 5 is a simplified block diagram of another apparatus for removing fat mass in a human body according to the present invention;

Fig. 6 is a flowchart of another method for removing fat mass
10 in a human body in accordance with the present invention; and

Fig. 7 is another exemplary table showing entered individual information of a user and related aerobic exercise criteria and condition set automatically based on the individual information.

5. Modes for Carrying out the Invention

15 In order that the invention may be fully understood, preferred embodiments thereof will now be described with reference to the accompanying drawings.

Fig. 1 is a simplified block diagram of an apparatus for removing body fat in a human body according to the present
20 invention. The apparatus of Fig. 1 comprises a low-frequency oscillator 1 oscillating low-frequency pulses of 10 ~ 120Hz; a key entering unit 4 for entering individual information of a user such as age, weight, height, etc.; a controller 2 controlling operations of all elements, and calculating FR and setting aerobic
25 exercise criteria such as heart rate reference for a person based on the entered individual information; a memory 3 for storing the calculated FR and the set heart rate reference, the entered individual information, and temporary data for controlling operations of all elements; a timer 5 for counting time set for
30 control operation of the controller 2; a displaying unit 6 for presenting individual information entered from the key entering unit 4 and control status of the controller 2; a sensor 7 sensing heartbeats with its surface attached onto a heartbeat-detectable

part of a human body; and a conducting unit 100 equipping with several fat-part attaching pads through which the low-frequency pulses from the low-frequency oscillator 1 are applied into target parts of a human body.

5 As shown on Fig. 2, the conducting unit 100 comprises a flexible flat belt 20 of which material is non-woven fabric for ventilation; a pair of Velcro tapes 21a and 21b attached at each side of the flat belt 20; and several surface-attaching pads 10a, 10b,... for conducting the low-frequency pulses into target fat
10 parts.

The pads effectively conducts 10~120Hz pulses into a target fat part, for example, abdominal region in which fat mass is over-accumulated. The surface-attaching pads are fixed on the flat belt 20 with positive(+) and negative(-) pole paired. Each
15 pair of pads is arranged at 5-cm intervals to equally apply the low-frequency pulses to a fat part and is also arranged such that each dipole moment of each pair should be alternated as shown in Fig.2 to prevent frequency interference between neighboring pairs.

20 An obesity patient or a person who wants to remove his or her fat mass accumulated in a certain part spreads some gel onto a target part to decrease resistivity between pads and skin, and the conducting unit 100 is closely attached around the gel-spread part. Due to this tightly attachment, the person can practice an
25 aerobic exercise such as running while body fat resolving treatment by low-frequency pulses is in progress.

When individual information of a user such as age, weight and height is entered through the key entering unit 4, the controller 2 calculates FR of the user and sets standard reference
30 of heart rate (called 'SRHR' hereinafter) based on the entered individual information, and controls operations of all elements to effectively remove fat mass of the target part. The detailed operations for effectively removing body fat are as follows.

Fig. 3 is a flowchart of a method for removing fat mass in a human body in accordance with the present invention. When a user enters his or her individual information such as age, weight, and height (S10) through the key entering unit 4, the controller 2 calculates FR of the user and sets SRHR adequate to the calculated FR using the following equations (S11).

SRHR = Standard Heart Rate by Age - $a = ((220 - \text{entered Age}) \times 0.6) - a$, where a is a heart rate decrement factor (HRDF) according to FR -----Eq. (1)

10 FR = $((\text{entered Weight} - \text{Standard Weight}) / (\text{Standard Weight})) \times 100$ -----Eq. (2)

Standard Weight by Height = $(\text{entered Height} - 100) \times 0.9$ -----Eq. (3)

For example, as shown in Fig.4, if an entered weight of a user is 70kg and height is 160cm, the standard weight classified by height is calculated to 54kg based on the given Eq. (3), and FR is calculated to 29.6% based on the given Eq. (2) because $((70-54)/54) \times 100 = 29.6$. In general, not more than 10% of the standard weight is regarded as normal weight, and 10% to 20% is regarded as overweight. More than 20% is regarded as obesity.

And, if entered user's age is 35, the standard heart rate of that age is calculated to 111 based on the Eq. (1), namely, $(220 - 35) \times 0.6$. At that time, the HRDF $a=20$ predefined for that FR is subtracted from the calculated standard heart rate, therefore, the SRHR for the user is determined to 91.

The HRDF a is pre-specified in consideration of the fact that heart rate of an obesity patient becomes higher than that of normal person even though they are doing same aerobic exercise such as running. The pre-specified HRDF a may not be subtracted if a user choose to do that. The FR and SRHR calculated as above are stored in the memory 3 and also displayed on the displaying unit 6 as characters, therefore a user can check his or her FR

and SRHR easily.

After that, the controller 2 drives the low-frequency oscillator 1 to apply low-frequency pulses through several pads 10a, 10b, 11a, 11b, of the belt-type conducting unit 100 which are stick to a target part, for example, abdominal region in which fat mass is over-accumulated, and controls the timer 5 to set aerobic exercising time, for example, 20 minutes (S12).

The aerobic exercising time is set in consideration of the time of carbohydrate decomposition preceding decomposition of accumulated body fat mass. The aerobic exercising time may be set differently according to the FR and SRHR calculated based on the individual information entered through the key entering unit 4.

The controller 2 counts heartbeat signals outputted from the clip-shaped sensor 7 which is stick to a certain part such as an ear of a user, and measures the current heart rate of a user. After that, the controller 2 compares the measured heart rate with the set SRHR (S13), and if the difference exceeds the SRHR more than a predetermined allowable range (S14), for example, 10% of SRHR, it displays a warning message on the displaying unit 6 and/or outputs a warning sound through a buzzer (S15).

Accordingly, a user can perform aerobic exercise such as running more fully within the warning range. When a user feels less stimulus of the low-frequency pulses after a while, for example, 30 seconds (S16), the controller 2 controls the low-frequency oscillator 1 to change frequency of the pulses being applied to the conducting unit 100, or pulse interval intermittently (S17).

When the set aerobic exercising time expires (S18) while the controller 2 conducts the above-explained operations, the controller 2 outputs a message or sound notifying end of exercising time, and stops the oscillating operation of the low-frequency oscillator 1 (S19).

Accordingly, a user can practice an aerobic exercise such

as running continuously while he or she undergoes medical treatment of removing body fat by pulses of low-frequency band applied through his or her wearing belt-type conducting unit with several pads tightly wrapping the fat part, therefore, efficiency
5 of body fat removal is doubled.

Fig. 5 is a simplified block diagram of another apparatus for removing body fat in a human body according to the present invention. The apparatus of Fig. 5, especially integrated into a running machine for an indoor aerobic exercise such as running,
10 comprises a low-frequency oscillator 1 oscillating low-frequency pulses of 10 ~ 120Hz; a key entering unit 4 for entering individual information of a user such as age, weight, height, etc.; a controller 2 controlling operations of all elements, and calculating FR and setting aerobic exercise criteria such as SRHR
15 for a user based on the entered individual information; a memory 3 for storing the calculated FR and the set SRHR, the entered individual information, and temporary data for controlling operations of all elements; a timer 5 for counting time set for control operation of the controller 2; a displaying unit 6 for
20 presenting individual information entered from the key entering unit 4 and control status of the controller 2; a sensor 7 sensing heartbeats with its surface attached onto a certain heartbeat-detectable part of a human body; and a conducting unit 100, to be wrapped around a fat part of a human body, equipping
25 with several fat-part attaching pads through which the low-frequency pulses from the low-frequency oscillator 1 are conducted into target parts of a human body.

The controller 2 controls a motor driving unit 31, installed in a running machine 300, which drives both a motor 33 for
30 circulating a belt board 34 and another motor 32 for adjusting slope of the belt board 34.

Same as the previous description referring to the apparatus of Fig. 2, the conducting unit 100, wrapped tightly around a target

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part of user's body, conducts pulses of 10~120Hz oscillated from the low-frequency oscillator 1 into target fat parts of a user.

An obesity patient or a person who wants to remove his or her fat mass accumulated in a certain part spreads some gel onto a target part to decrease resistivity between pads and skin, and the conducting unit 100 is closely wrapped around the gel-spread part. Due to this tightly attachment, the person can practice an aerobic exercise such as running while body fat resolving treatment by low-frequency pulses is in progress.

10 When individual information of a user such as age, weight and height is entered through the key entering unit 4, the controller 2 calculates FR of the user and sets SRHR, aerobic exercise condition such as running speed, etc. based on the entered individual information, and controls operations of all 15 elements to effectively remove fat mass of a target part.

The above-described body fat removing apparatus may be integrated into a running machine, or it may be manufactured as a separate control box to be connected to a side of a running machine.

20 Fig. 6 is a flowchart of another method for removing fat mass in a human body in accordance with the present invention.

Same as explained above for the former embodiment, when a user enters his or her individual information such as age, weight, and height (S30) through the key entering unit 4 of the body fat 25 removing apparatus connected with the running machine 300, the controller 2 calculates FR of the user and sets SRHR and running speed adequate to the calculated FR using the aforementioned Eqs. (1) to (3) (S31).

For example, as given in Fig. 7, FR of a user is derived based 30 on his or her weight and height, and SRHR for that age is calculated based on entered his or her age. After that, HRDF α for the derived FR is subtracted from the calculated SRHR to decrease the SRHR of the user, if he or she is determined to obesity, to appropriate

value. In addition, the running speed of the running machine 300 is set in inverse proportion to the derived HR of the user.

Running speed of the running machine 300 may have pre-defined discrete speed levels, so that one of them is chosen and set based on FR of an obesity patient. The FR, SRHR, and aerobic condition of running speed to be set as above are stored in the memory 3 and are also displayed on the displaying unit 6 as characters, therefore a user can recognize his or her FR, SRHR, and running speed, easily.

After that, the controller 2 drives the low-frequency oscillator 1 to apply low-frequency pulses through the several pads 10a, 10b, 11a, 11b, of the belt-type conducting unit 100 wrapped tightly around a target part, for example, abdominal region in which fat mass is over-accumulated, and it sends time data of aerobic exercise such as running to the timer 5 to set aerobic exercising time, for example, 20 minutes (S32).

The controller 2 counts heartbeat signals outputted from the clip-shaped sensor 7 which is stick to a certain part of a user such as an ear, and measures the current heart rate of a running user. While measuring current heart rate, the controller 2 compares the measured heart rate with the set SRHR (S33), and if the difference exceeds the predefined allowable range (S34), it displays a warning message on the displaying unit 6 and/or outputs a warning sound through a buzzer and controls the motor driving unit 31 of the running machine 300 to adjust moving speed or slope of the circulating belt board 34 at the same time (S35).

For example, the controller 2 compares the measured heart rate with the set SRHR, and, if the measured heart rate is below the set SRHR more than the predefined allowable range, it displays a warning message on the displaying unit 6 and/or outputs a warning sound through a buzzer, and, at the same time, increases slope or moving speed of the motor-driven belt board 34 through controlling the motor driving unit 31 of the running machine to

increase strength of exercise.

If the difference is above the set SRHR more than the predefined allowable range, the controller 2 also displays another warning message on the displaying unit 6 and/or outputs
5 another warning sound through the buzzer, and decreases slope or moving speed of the belt board 34 to decrease strength of exercise.

When a user feels less stimulus of the low-frequency pulses after a while, for example, 30 seconds (S36), the controller 2 controls the low-frequency oscillator 1 to change frequency of
10 the pulses being applied to the conducting unit 100, or pulse interval intermittently (S37).

When the set aerobic exercising time expires (S38) while the controller 2 conducts the above-explained operations, the controller 2 outputs a message or sound notifying end of
15 exercising time, and stops the operation of the low-frequency oscillator 1 and the motor-driven belt board 34 of the running machine 300 gradually (S39).

Accordingly, a user can keep practicing an aerobic exercise such as running while he or she undergoes medical treatment of
20 removing body fat by pulses of low-frequency band being applied through his or her wearing belt-type conducting unit with several pads tightly wrapping the fat part, therefore, body fat can be removed much more efficiently due to exercise and concurrent pulse applying.

25 The planar shape of the surface-attaching pads 10a, 10b, ... may be round or rectangular to be attached tightly onto target parts of a human body. The surface-attaching pads may be equipped in a flexible long band, an abdominal binder, or a suit-type conducting unit, of which material is non-woven fabric for
30 ventilation, besides the belt-type conducting unit 100, in order to apply low-frequency pulses oscillated from the low-frequency oscillator 1 into fat mass accumulated in a human body.

Each aerobic exercise criteria and condition set based on

individual information may be stored as an item of a table in the memory 3. After this tabulation, aerobic exercise criteria and condition corresponding to input individual information can be chosen among items of the table and be set without calculation.

5 Or if a user presses a special key on the key entering unit 4, an aerobic exercise criteria and condition defined in connection with the special key can be set through mechanical or electronic operation, which may simplify the structure of the body fat removing apparatus. Also, the apparatus for removing body fat in

10 a human body may be implemented without the low-frequency oscillator 1 and the conducting unit 100 in case that it is linked with an exercising machine such as a running machine.

Furthermore, the apparatus for removing body fat in a human body may be equipped in another exercising machine, namely, a

15 stepper or a bicycle.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope

20 of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

CLAIMS

1. An apparatus for removing body fat in a human body, comprising:

a generating means generating electric pulses of
5 low-frequency band; and

a transmitting means transmitting the electric pulses to an exercising human body.

2. The apparatus set forth in claim 1, wherein said transmitting means comprises surface-attaching pads.

10 3. The apparatus set forth in claim 2, wherein the surface-attaching pads consist of a plurality of pairs of positive(+) and negative(-) pole pads, each pair being arranged at predetermined intervals, and also arranged such that each dipole moment of each pair should be alternated.

15 4. The apparatus set forth in claim 1, wherein said generating means changes the frequency band of the electric pulses at intervals, or changes pulse interval intermittently.

5. A body fat removing apparatus installed in an athletic equipment, comprising:

20 a generating means generating electric pulses of low-frequency band;

a transmitting means transmitting the electric pulses to an exercising human body; and

25 an attaching means for attaching the transmitting means onto the exercising human body.

6. The apparatus set forth in claim 5, wherein said attaching means is a belt, a long band, an abdominal binder, or a suit which is made of flexible material.

7. The apparatus set forth in one of claims 1 to 5, further
30 comprising:

a measuring means for measuring heart rate of the human body;
and

a comparing means for comparing the measured heart rate with
a preset heart rate reference.

5 8. The apparatus set forth in claim 5, further comprising:
a measuring means for measuring heart rate of the human body;
a comparing means for comparing the measured heart rate with
a preset heart rate reference; and

a controller for controlling operation of said athletic
10 equipment based on the comparison result of said comparing means.

9. A method for removing body fat in a human body, comprising
the steps of:

generating electric pulses of low-frequency band; and
transmitting the electric pulses to an exercising human
15 body.

10. The method set forth in claim 9, further comprising the
steps of:

measuring heart rate of the human body; and
comparing the measured heart rate with a preset heart rate
20 reference.

11. The method set forth in claim 10, further comprising the
step of controlling operation of an athletic equipment based on
the result of said comparing step.

12. The method set forth in claim 11, wherein said
25 controlling step controls the exercising speed and/or slope
and/or exercising time of the athletic equipment.

13. The method set forth in claim 10 or 11, further
comprising the step of outputting a warning message or a warning
sound based on the result of said comparing step.

30 14. The method set forth in claim 10, wherein the heart rate
reference is determined based on an age and/or maximum heart rate
and/or fatness ratio of the human body.

15. A body fat removing apparatus installed in an aerobic

athletic equipment, comprising:

a measuring means for measuring heart rate of a user;

a comparing means for comparing the measured heart rate with a preset heart rate reference; and

5 a controller for controlling operation of said athletic equipment based on the comparison result of said comparing means.

16. An apparatus for removing body fat in a human body, comprising:

a generating means generating electric pulses of
10 low-frequency band;

a transmitting means transmitting the electric pulses to an exercising human body;

an attaching means for attaching the conducting means onto the exercising human body, wherein said generating means, said
15 transmitting means, and said attaching means are installed in an athletic equipment;

a measuring means for measuring current heart rate of a person exercising on the athletic equipment;

a comparing means for comparing the measured heart rate with
20 a preset heart rate reference; and

a controller for controlling operation of the athletic equipment based on the comparison result of the comparing means.

17. The apparatus set forth in claim 15 or 16, wherein the heart rate reference is determined based on an age and/or maximum
25 heart rate and/or fatness ratio of the person.

18. The apparatus set forth in claim 15 or 16, wherein said controller controls the exercising speed and/or slope and/or exercising time of the athletic equipment.

19. The apparatus set forth in claim 15 or 16, further
30 comprising an alarming means for outputting a warning message or a warning sound based on the comparison result of said comparing means.

AMENDED CLAIMS

[received by the International Bureau on 22 October 2001 (22.10.01);
original claim 1-19 replaced by amended claims 1-13 (3 pages)]

1. An apparatus for removing body fat in a human body,
comprising:

a heart rate detector of a human body;

5 a comparator, electrically coupled to said detector,
between the detected heart rate and a predetermined heart rate
reference; and

an aerobic athletic equipment operatively controlled by a
controller responsive to the output of the comparator.

10 2. An apparatus for removing body fat in a human body
comprising:

a heart rate detector of a human body;

a comparator, electrically coupled to said detector,
between the detected heart rate and a preset heart rate
15 reference; and

an indicator, coupled to the comparator, that output a
alarming signal responsive to the output of the comparator.

3. The apparatus set forth in one of claims 1 and 2,
further comprising:

20 a pulse generator in low frequency band; and

a transmitter, coupled to said generator, output the
pulse from said generator to human body in a aerobic exercise
state.

25 4. The apparatus for removing body fat in a human body,
comprising:

a pulse generator in low frequency band;

a transmitter, coupled to said generator, output the
pulse from said generator to human body in a aerobic exercise
state.

30 5. The apparatus set forth in claim 4, wherein said
generator changes the frequency band of the electric pulses

at intervals, or changes pulse interval intermittently.

6. The apparatus set forth in one of claims 3 and 4, wherein said transmitter comprises a contacting means on the human body.

5 7. The apparatus set forth in claim 4, wherein said contacting means consists of a plurality of positive(+) and negative(-) pole pads, arranged such that dipole moment of pads should be alternated.

8. A method for removing body fat in a human body,
10 comprising the steps of:

detecting a heart rate of a human body;

comparing said detected heart rate to a predetermined heart rate; and

controlling operation of an aerobic athletic equipment
15 responsive to the output of the comparing.

9. The method set forth in claim 7, wherein controlling step controls the driving speed and/or the driving slope of said aerobic athletic equipment.

10. A method for removing body fat in a human body,
20 comprising the steps of:

detecting a heart rate of a human body;

comparing said detected heart rate to a predetermined heart rate; and

indicating a alarming signal responsive to the output of
25 the comparator.

11. The method set forth in one of claims 7 to 9, further comprising:

generating electric pulses of low frequency band; and

transmitting said generated pulse to human body in a
30 aerobic exercise state.

12. The method for removing body fat in a human body, comprising the steps of:

generating electric pulses of low frequency band; and

transmitting said generated pulse to human body in a aerobic exercise state.

13. The method set forth in one of claims 9 and 10, wherein the predetermined heart rate reference is determined
5 based upon an age and/or an maximum heart rate and/or an fatness ratio of an user.

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FIG. 1

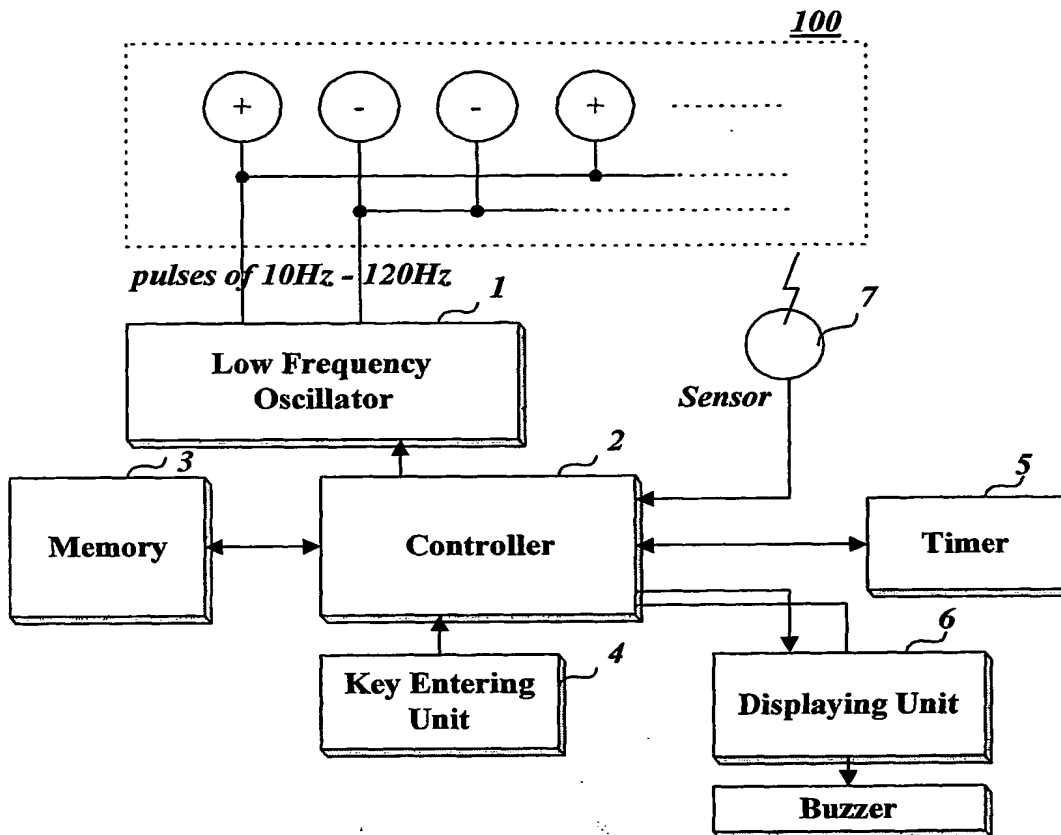
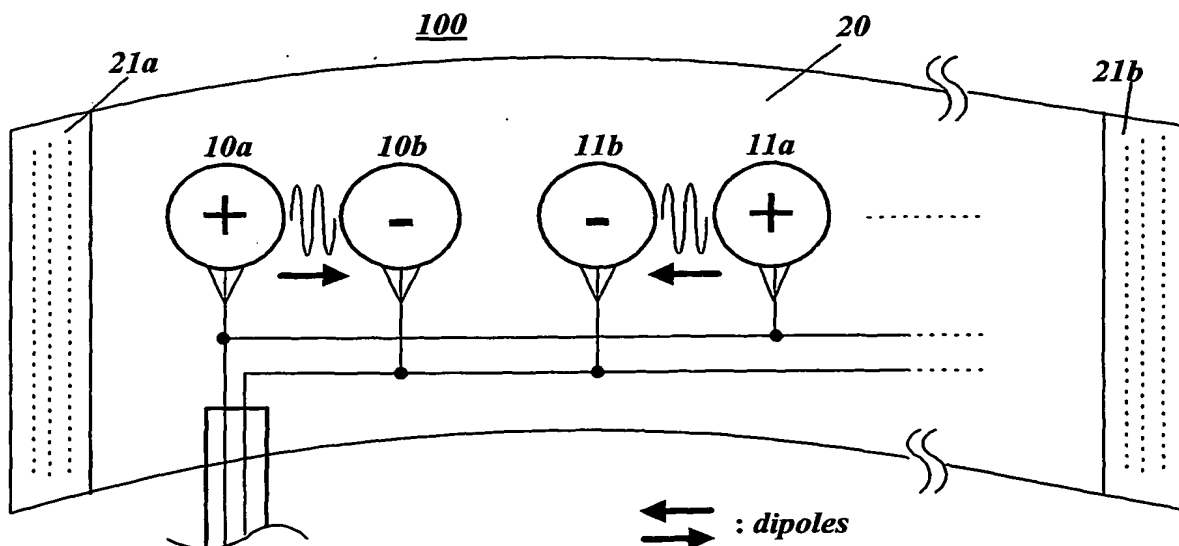
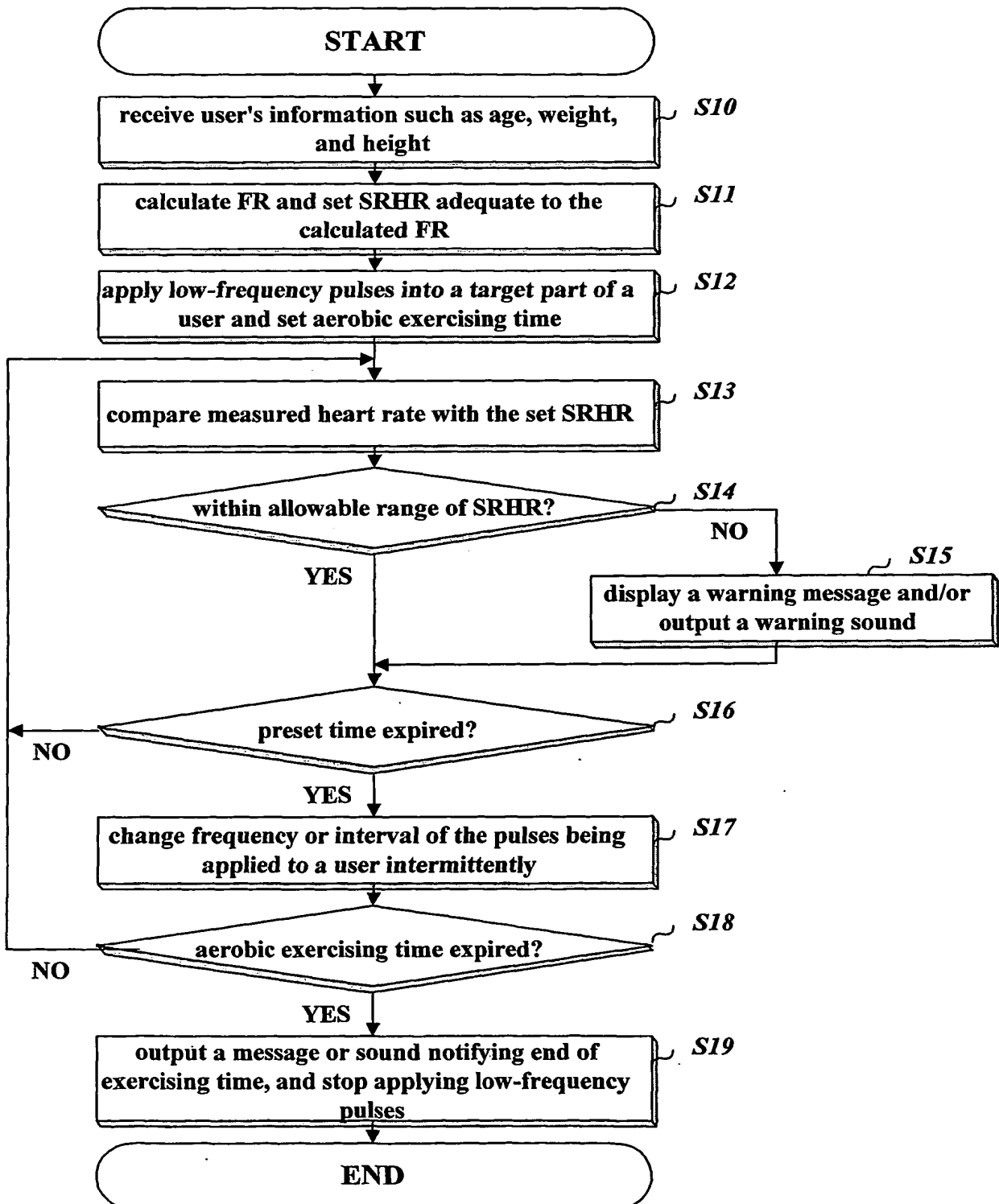


FIG. 2



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FIG. 3

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FIG. 4

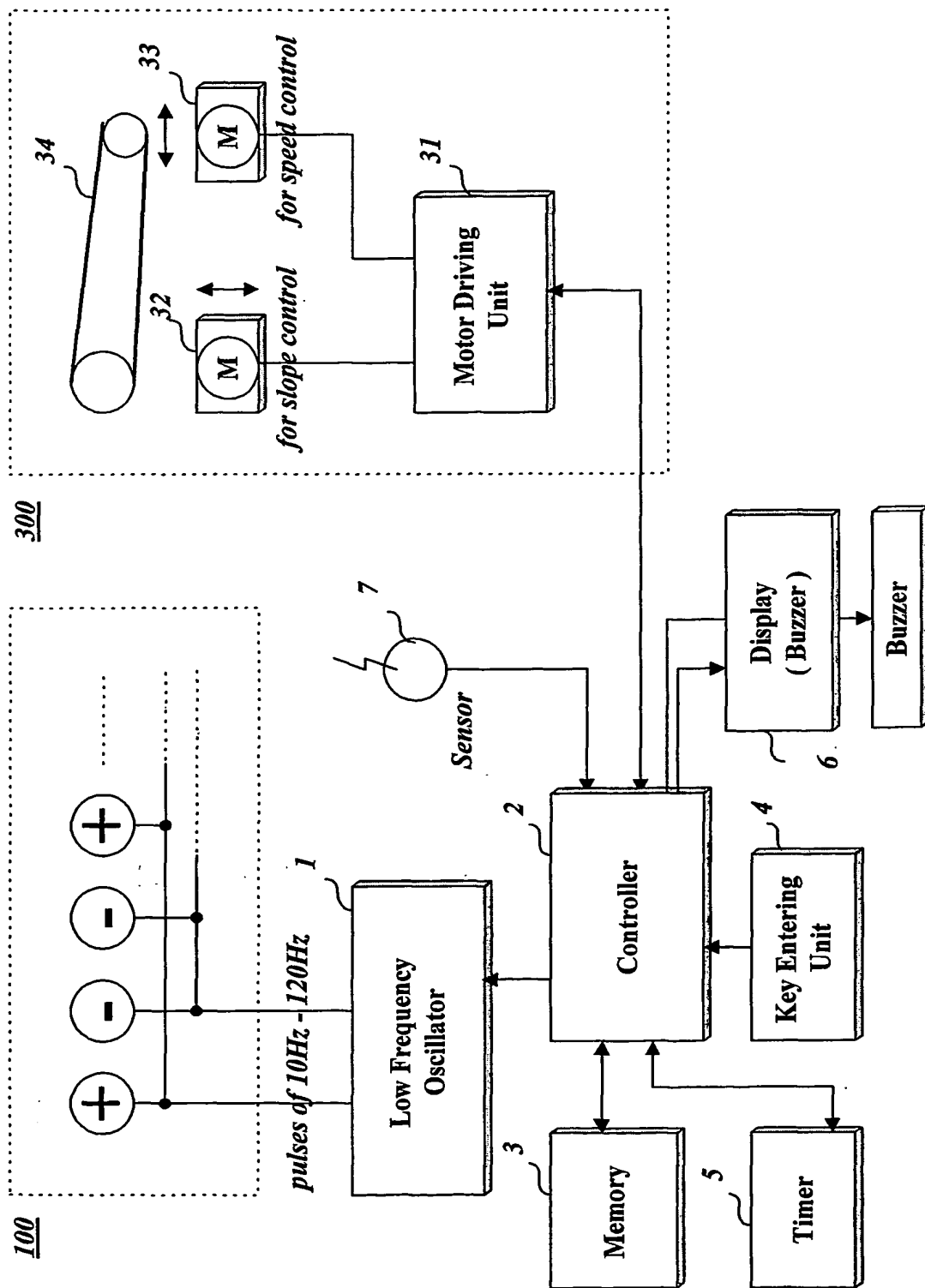
	Age	Weight	Height	Fatness Rate	Heart Rate Reference
User 1	35yr	70kg	160cm	29.6%	189
User 2	40yr	75kg	150cm	66.6%	176
⋮	⋮	⋮	⋮	⋮	⋮

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FIG. 5



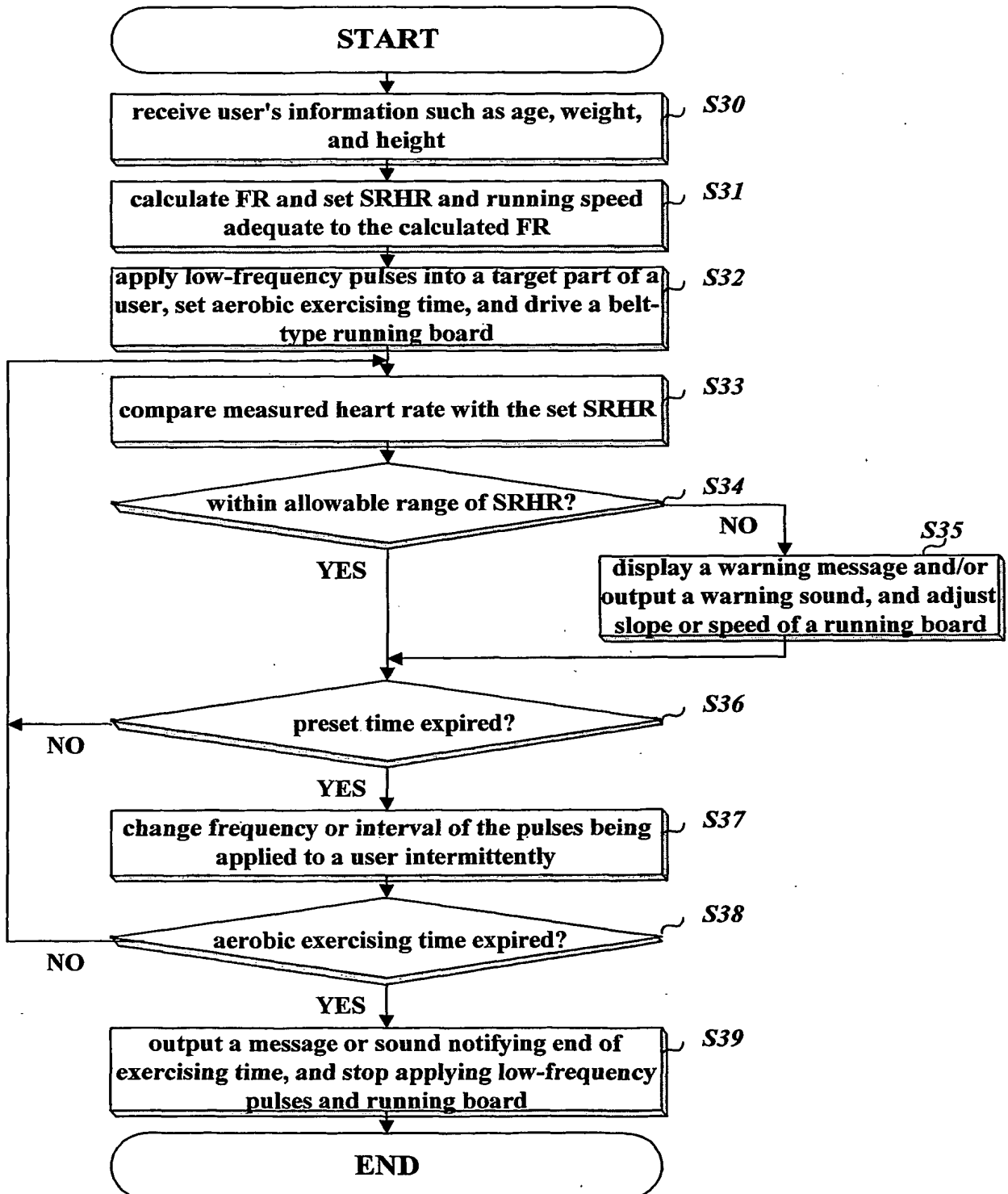
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FIG. 6

	Age	Weight	Height	Fatness Rate	Heart Rate Reference	Running Speed
User 1	35yr	70kg	160cm	29.6%	189	6km/hr
User 2	40yr	75kg	150cm	66.6%	176	4km/hr
⋮	⋮	⋮	⋮	⋮	⋮	⋮

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FIG. 7

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INTERNATIONAL SEARCH REPORT

national application No.
PCT/KR01/00455

A. CLASSIFICATION OF SUBJECT MATTER**IPC7 A61N 1/32**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimun documentation searched (classification system followed by classification symbols)

IPC7 A61B 5/05, A61B 5/042, A61N 1/32, A61F 7/00

Documentation searched other than minimun documentation to the extent that such documents are included in the fileds searched

Korean Patents and applications for inventions since 1975

Korean Utility models and applications for Utility models since 1975

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search trerms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 2000-0049836(JEON, KYUNG TAK) 05 AUG 2000 - See the all document	1 - 6
A	JP 10-5266(RUSENTO CORP) 13 JAN 1998 - See the all document	1
A	JP 09-509877(PORARU ELECTRO OE) 07 OCT 1997 - See the all document	7,8,15,16
A	JP 09-51883 (SEKISUI CHEMICAL CORP) - See the all document	15-17
P,A	KR 2001-0040250(YAMATO SEIKO CORP) 15 MAY 2001, - See the all document	7,15-17
A	JP 11-113872(TANITA CORP) 27 APR 1999 - See the all document	7,15-19

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

25 JULY 2001 (25.07.2001)

Date of mailing of the international search report

27 JULY 2001 (27.07.2001)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, Dunsan-dong, Seo-gu, Daejeon
Metropolitan City 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

LEE, Heui Deok

Telephone No. 82-42-481-5546



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR01/00455

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 9-14
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 9-14 are directed to method of treatment of the human body by therapy methods practiced on the human body under Rule 39.1(iv).
2. ☐ Claims Nos.:
because they relate to part of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Search Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be established without effort justifying an additional fee, this Authority did not invite payment of any addition fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR01/00455

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 2000-0049836	05, 08, 2000	NONE	
JP 10-5266	13, 01, 1998		
JP 09-509877	07, 10, 1997		
JP 09-51883	25, 02, 1997		
KR 2001-0040250	15, 05, 2001		
JP 11-113872	27, 04, 1999		

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PCT REQUEST

1/3

P01874DP

Original (for SUBMISSION) - printed on 22.03.2001 01:27:03 PM

0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4	Form - PCT/RO/101 PCT Request	
0-4-1	Prepared using	PCT-EASY Version 2.91 (updated 01.01.2001)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	Korean Industrial Property Office (RO/KR)
0-7	Applicant's or agent's file reference	P01874DP
I	Title of invention	APPARATUS AND METHOD FOR SELECTIVELY REMOVING A BODY FAT MASS OF HUMAN BODY
II	Applicant	
II-1	This person is:	applicant and inventor
II-2	Applicant for	all designated States
II-4	Name (LAST, First)	SON, Young Tae
II-5	Address:	3-206, Wooseong Apt., 503, Daechi-dong, Kangnam-gu 135-828 Seoul Republic of Korea
II-6	State of nationality	KR
II-7	State of residence	KR
II-8	Telephone No.	82-32-651-7823
II-9	Facsimile No.	82-32-614-2356
IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name (LAST, First)	PARK, Lae Bong
IV-1-2	Address:	1 Fl., Dongun Bldg., 413-4, Dogok 2-dong, Kangnam-gu 135-272 Seoul Republic of Korea
IV-1-3	Telephone No.	82-2-529-4635
IV-1-4	Facsimile No.	82-2-529-4636
IV-1-5	e-mail	tlbpat@chollian.net

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V	Designation of States	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	<p>AP: GH GM KE LS MW MZ SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT</p> <p>EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT</p> <p>EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR and any other State which is a Contracting State of the European Patent Convention and of the PCT</p> <p>OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT</p>
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	<p>AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH&LI CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW</p>
V-5	Precautionary Designation Statement In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.	
V-6	Exclusion(s) from precautionary designations	NONE
VI-1	Priority claim of earlier national application	
VI-1-1	Filing date	21 June 2000 (21.06.2000)
VI-1-2	Number	2000-34253
VI-1-3	Country	KR
VII-1	International Searching Authority Chosen	Korean Industrial Property Office (KIPO) (ISA/KR)


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PCT REQUEST

3/3

P01874DP

Original (for SUBMISSION) - printed on 22.03.2001 01:27:03 PM

VIII	Check list	number of sheets	electronic file(s) attached
VIII-1	Request	3	-
VIII-2	Description	17	-
VIII-3	Claims	4	-
VIII-4	Abstract	1	EZABST00.TXT
VIII-5	Drawings	6	-
VIII-7	TOTAL	31	
	Accompanying items	paper document(s) attached	electronic file(s) attached
VIII-8	Fee calculation sheet	✓	-
VIII-9	Separate signed power of attorney	✓	-
VIII-12	Priority document(s)	Item(s) VI-1	-
VIII-16	PCT-EASY diskette	-	diskette
VIII-18	Figure of the drawings which should accompany the abstract	1	
VIII-19	Language of filing of the international application	Korean	
IX-1	Signature of applicant or agent		
IX-1-1	Name (LAST, First)	PARK, Lae Bong	

FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/KR
10-6	Transmittal of search copy delayed until search fee is paid	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	
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PCT COOPERATION TREATY

PCT

NOTICE INFORMING THE APPLICANT OF THE
COMMUNICATION OF THE INTERNATIONAL
APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

PARK, Lae, Bong
1st Floor, Dongun Building
413-4, Dogok 2-dong
Kangnam-gu
Seoul 135-272
RÉPUBLIQUE DE CORÉE

Date of mailing (day/month/year) 27 December 2001 (27.12.01)		IMPORTANT NOTICE	
Applicant's or agent's file reference P01874DP			
International application No. PCT/KR01/00455	International filing date (day/month/year) 22 March 2001 (22.03.01)	Priority date (day/month/year) 21 June 2000 (21.06.00)	
Applicant SON, Young, Tae et al			

1. Notice is hereby given that the International Bureau has **communicated**, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this notice:
KP,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
AE,AG,AL,AM,AP,AT,AU,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CR,CU,CZ,DE,DK,DM,DZ,EA,EE,EP,
ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,
MK,MN,MW,MX,MZ,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this notice is a copy of the international application as published by the International Bureau on 27 December 2001 (27.12.01) under No. WO 01/97904

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a **demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and the PCT Applicant's Guide, Volume II.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Zahra
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.91.11

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PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

PARK, Lae, Bong
1st Floor, Dongun Building
413-4, Dogok 2-dong
Kangnam-gu
Seoul 135-272
RÉPUBLIQUE DE CORÉE

Date of mailing (day/month/year) 09 August 2001 (09.08.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference P01874DP	
International application No. PCT/KR01/00455	International filing date (day/month/year) 22 March 2001 (22.03.01)

1. The following indications appeared on record concerning:

☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative

Name and Address

SON, Young, Tae
3-206 Wooseong Apt.
503, Daechi-dong
Kangnam-gu
Seoul 135-828
Republic of Korea

State of Nationality

KR

State of Residence

KR

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address

MOM & MAM INC.
175-6, Shimgok 2-dong
Wonmi-gu, Bucheon
Kyunggi-do
420-823
Republic of Korea

State of Nationality

KR

State of Residence

KR

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

The person in Box 2 has been added as applicant for all designated States except US. The person in Box 1 remains inventor and applicant for US only.

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☒ the International Searching Authority ☐ the elected Offices concerned
☐ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Anman QIU

Telephone No.: (41-22) 338.83.38

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PCT COOPERATION TREATY

PCT

**NOTIFICATION CONCERNING
THE FILING OF AMENDMENTS OF THE CLAIMS**
(PCT Administrative Instructions, Section 417)

From the INTERNATIONAL BUREAU

To:

PARK, Lae, Bong
1st Floor, Dongun Building
413-4, Dogok 2-dong
Kangnam-gu
Seoul 135-272
RÉPUBLIQUE DE CORÉE

Date of mailing (day/month/year) 07 November 2001 (07.11.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference P01874DP	
International application No. PCT/KR01/00455	International filing date (day/month/year) 22 March 2001 (22.03.01)
Applicant SON, Young, Tae et al	


1. The applicant is hereby notified that amendments to the claims under Article 19 were received by the International Bureau on:

22 October 2001 (22.10.01)

2. This date is within the time limit under Rule 46.1.

Consequently, the international publication of the international application will contain the amended claims according to Rule 48.2(f), (h) and (i).

3. The applicant is reminded that the international application (description, claims and drawings) may be amended during the international preliminary examination under Chapter II, according to Article 34, and in any case, before each of the designated Offices, according to Article 28 and Rule 52, or before each of the elected Offices, according to Article 41 and Rule 78.

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorised officer</p> <p></p> <p>Ki-Nam HA</p> <p>Telephone No.: (41-22) 338.83.38</p>
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